Detailed Model Description

This section describes the variables, constraints, and other attributes in the linear program formulation of WinDS. It outlines, in order:

1. Subscripts (variables and constraints)
2. Major decision variables
3. The objective function
4. Constraints
5. Wind intermittency parameters
6. Retirement of capacity
7. Financial parameters

1. Subscripts

We list the major subscripts below:

Regional

Wind supply and demand regions are denoted by **i** or **j**. They are referred to both as wind supply and wind demand, because we track both where the wind power is generated and to where it is transmitted. This allows us to ensure adequate transmission capacity is available to exit the supply region and to enter the demand region. It also allows us to ensure that the wind generation consumed in a power control area (PCA) is distributed throughout the PCA and not just at the closest point to the wind supply region. There are 358 wind supply/demand regions.

PCAs are denoted by **p** and **n**. There are 136 PCAs, each of which contains one or more wind supply/demand regions.

NERC regions/subregions are denoted by **r.** There are 13 NERC regions/subregions, each of which contains several PCAs.

Interconnection areas are denoted by **in**. There are three interconnect regions, each of which contains one or more NERC regions.

Time

Time slices are denoted by **m**. There are 16 time slices during each year, with four seasons and four daily time slices in each season. (We use the word "slice" to distinguish from the 2-year "periods" for which the LP is run between 2000 and 2050.)

Seasons are denoted by **s**. There are four seasons.

Technology/Resource

Wind resource classes: Wind classes are denoted by **c**. There are five wind classes (3-7).

Conventional generator types are denoted by **q**. There are 14 different types of conventional generators